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Deployment Stressors, Gender, and Mental Health Outcomes Among Gulf War I Veterans

Dawne S. Vogt,[1,2,4] Anica P. Pless,[1] Lynda A. King,[1,2,3] and Daniel W. King[1,2,3]

Findings indicate that war-zone exposure has negative implications for the postdeployment adjustment of veterans; however, most studies have relied on limited conceptualizations of war-zone exposure and focused on male samples. In this study, an array of deployment stressors that were content valid for both female and male Gulf War I military personnel was examined to elucidate gender differences in war-zone exposure and identify gender-based differential associations between stressors and mental health outcomes. While women and men were exposed to both mission-related and interpersonal stressors and both stressor categories were associated with mental health outcomes, women reported more interpersonal stressors and these stressors generally had a stronger impact on women's than on men's mental health. Exceptions are described, and implications are discussed.

The negative mental health consequences of war-zone exposure are well established. Findings indicate that stressful and traumatic deployment experiences are associated with a variety of negative mental health consequences, including depression, anxiety, and posttraumatic stress disorder (PTSD) (e.g., King, King, Gudanowski, & Vreven, 1995; Litz, King, King, Orsillo, & Friedman, 1997); however, few researchers have used measures that adequately capture the range of stressors to which military personnel may be exposed in the war zone (Marshall, Davis, & Sherbourne, 2000). In turn, the less-than-ideal content representativeness of assessments of war-zone exposure has made it difficult to draw valid conclusions regarding the impact of deployment stressors on mental health outcomes. Moreover, research on war-zone stressors has tended to rely on male samples, demonstrating that war-zone exposure results in negative mental health consequences for a number of men (e.g., Boscarino, 1979; Green, Lindy, Grace, & Gleser, 1989).

With an increasing number of women entering the military, their expanding occupational roles, and mounting evidence for the deleterious impact of war-zone exposure on their health, interest in women's military experiences has grown (Bell, Roth, & Weed, 1998). More specifically, researchers and clinicians have questioned whether women experience distinct deployment stressors when compared with men and whether deployment stressors have a different impact on the mental health of women and men. In the current study, we examined a wide range of deployment stressors that were content valid for military personnel deployed to the 1990–1991 Gulf War (Gulf War I) to elucidate gender differences in war-zone exposure and to identify gender-based differential associations between deployment stressors and indicators of long-term mental health.

As several researchers have noted, the majority of early studies of deployment stressors experienced by Vietnam veterans focused on exposure to combat events (e.g., firing a weapon, being fired upon, or witnessing injury or death of fellow unit members) to the exclusion

[1]National Center for Posttraumatic Stress Disorder, VA Boston Healthcare System, Boston, Massachusetts.
[2]Department of Psychiatry, Boston University School of Medicine, Boston, Massachusetts.
[3]Department of Psychology, Boston University, Boston, Massachusetts.
[4]To whom correspondence should be addressed at National Center for Posttraumatic Stress Disorder (116B-5), 150 South Huntington Avenue, Boston, Massachusetts 02130; e-mail: Dawne.Vogt@med.va.gov.

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of other potential deployment stressors (King, King, et al., 1995; Wolfe, Brown, Furey, & Levin, 1993; Wolfe, Brown, & Kelley, 1993). In response to criticism regarding the limited content validity of assessments of war-zone exposure, several researchers extended their conceptualizations to include additional stressor dimensions (e.g., Gallers, Foy, Donahoe, & Goldfarb, 1988; King, King, et al., 1995). For example, King, King, et al. (1995) demonstrated differential associations between four different war-zone stressor representations and PTSD in their work with Vietnam veterans, supporting the usefulness of this multidimensional representation. Moreover, King, King, et al. (1995) documented differential associations for female and male veterans. Yet, as the authors themselves noted, their fourfold conceptualization of war-zone exposure may have been more relevant to, and representative of, men's than women's experiences. Thus, findings from this study as well as those from previous studies that have relied on less sophisticated conceptualizations of war-zone exposure may be somewhat limited with regard to conclusions that can be drawn about the consequences of war-zone exposure for women.

While some researchers studying Gulf War I veterans expanded their conceptualizations of war-zone exposure (e.g., Norwood & Ursano, 1996; Wolfe et al., 1998; Wright, Marlowe, & Gifford, 1996), the majority of researchers continued to focus on traditional combat (Marshall et al., 2000). Even among those who used multidimensional representations of war-zone exposure, few responded to the call for greater attention to deployment stressors that are more salient for women. Thus, findings from this literature may suffer from the same limited applicability to women's experiences as earlier research on Vietnam veterans.

In fact, several stressors that were not specifically related to the combat mission but that represent interpersonal factors may have been particularly salient for the women deployed to Gulf War I. This conflict represented the first time that women who were mothers—some who were single mothers—were mobilized for a deployment by U.S. forces. Considering that women are often primary caregivers, one might expect that concerns about family disruptions due to deployment would pose a significant stressor for these women. In addition, this war was the first major conflict in which large numbers of women and men lived and worked in close quarters. Thus, the stress of sexual harassment and other forms of interpersonal conflict between the genders might have been particularly salient for these veterans, and especially for women, given the predominantly "male" culture of the military and women's numerical minority status in the war zone.

Several studies have specifically targeted interpersonal stressors of this nature among female-only samples of Gulf War I veterans. For example, Bell et al. (1998) examined women's experiences of maternal guilt associated with leaving children during deployment as well as sexual harassment, finding that while both were stressors, only sexual harassment was associated with postwar stress symptomatology. Similarly, Wolfe et al. (1998) found that sexual harassment was implicated in the postdeployment health of female Gulf War I veterans (Wolfe et al., 1998). Although these results are certainly interesting, they cannot speak to gender differences in mean exposure to stressors or associations between stressors and postdeployment health outcomes. Early studies of gender differences in mission-related deployment stressors experienced by Vietnam veterans have generally suggested that men experience more mission-related deployment stressors as compared with women (e.g., King, King, et al., 1995). Results regarding gender-based differences in the impact of deployment stressors on mental health outcomes have been less consistent. Using the same database but different operationalizations of war-zone exposure, Kulka et al. (1990) found that war-zone exposure had a similarly negative impact on the postwar health of female and male Vietnam veterans while King, King, et al. (1995) found that exposure to combat-related circumstances had a stronger negative impact on the postwar health of women compared to men. A more recent study of Gulf War I veterans revealed no gender difference in associations between combat exposure and health outcomes after accounting for other factors that may moderate this association (Sutker, Davis, Uddo, & Ditta, 1995).

To our knowledge, only two studies have incorporated multiple representations of both mission-related and interpersonal stressors in studies of female and male Gulf War I veterans. In a study relating multiple dimensions of war-zone exposure to postwar PTSD and general psychological distress, Wolfe, Brown, and Kelly (1993) found that women were more likely to report that combat was their most stressful deployment experience while the genders were equally likely to report noncombat war-zone stressors and domestic stressors as their most stressful war-zone experiences. With regard to gender-based differential associations, exposure to death and accidents had a stronger negative impact on women's postdeployment health while anticipatory alert had a stronger negative impact on men's postdeployment health. Domestic stressors demonstrated similar associations with outcomes for women and men. In a second study, Rosen, Wright, Marlowe, Bartone, and Gifford (1999) found that female Gulf War I veterans experienced a more difficult working environment, more family problems, greater anticipation

of combat, and less unit cohesion compared with men. In turn, anticipation of combat was a stronger predictor of postwar distress for women while working environment, family problems, and unit cohesion were stronger predictors of health outcomes for men.

While these studies represent an advance over previous research in their attention to both mission-related and interpersonal stressors, inconsistencies in how stressors were conceptualized and operationalized make it difficult to compare findings across these studies or with previous studies. In the present study, we used a conceptualization of mission-related war-zone exposure that drew from the multidimensional representation used by King, King et al. (1995) in their earlier work with Vietnam veterans. Specifically, we assessed exposure to the mission-related stressors of combat experiences, aftermath of battle, perceived threat, and difficult living and working environment. In addition, we incorporated conceptualizations of interpersonal deployment stressors that may have been particularly salient for the women deployed to Gulf War I. We assessed concerns about family/relationship disruptions, lack of deployment social support, and exposure to sexual harassment. Consistent with our previous discussion regarding the salience of interpersonal stressors for women and our review of literature demonstrating that men experience more mission-related stressors than women (e.g., King, King, et al., 1995), we hypothesized that women would report greater exposure to interpersonal stressors while men would report greater exposure to mission-related stressors.

We also assessed the impact of deployment stressors on three key mental health outcomes. Although research on Vietnam veteran adjustment has emphasized PTSD as the primary outcome (e.g., Fontana & Rosenheck, 1998; King, King, et al., 1995; Kulka et al., 1990), the accumulating literature suggests that Gulf War I had an impact on a broader range of mental health outcomes, including depression and anxiety (Marshall et al., 2000). Thus, we examined the impact of deployment stressors on each of these three outcomes. We hypothesized that both mission-related and interpersonal stressors would demonstrate significant associations with indicators of mental distress. Moreover, given some evidence that women tend to place greater emphasis on interpersonal relationships than men (Moskowitz, Suh, & Desaulniers, 1994), we hypothesized that interpersonal stressors would demonstrate stronger associations with mental health outcomes for women. Finally, we compared the relative impact of mission-related stressors and interpersonal stressors on mental health outcomes. While we had no particular expectations regarding differential associations between deployment stressor categories and anxiety or depression, we did predict that mission-related stressors would demonstrate stronger associations with posttraumatic stress symptomatology. While our mission-related stressors encompassed experiences that are more likely to quality as highly traumatic events (e.g., combat, aftermath of battle) considered central to the development of PTSD, the interpersonal war-zone stressors we assessed can generally be classified as lower level stressors.

Method

Survey Procedure and Sample

Our sampling pool consisted of 495 Gulf War I veterans from across the United States. These veterans were originally identified through the Defense Manpower Data Center and the VA Gulf War Health Registry, and were selected such that there was an overrepresentation of women relative to their representation in Gulf War I (25% women, 75% men). We employed Mangione's (1998) multistep method to optimize our response rate. Potential participants were first mailed a letter that explained the purpose of the study, assured confidentiality, emphasized the voluntary nature of participation, and otherwise conformed to standards for the protection of human subjects. This letter was followed by a survey package containing a collection of stressor and health outcome measures. Later, a reminder card was sent, followed by a remailing of the package to nonrespondents, and then a final reminder card. Of those veterans whom we believe received the survey package, 317 provided completed questionnaires, corresponding to a 66% response rate. Participation rate varied slightly by gender and active duty versus Reserve/National Guard status. Women were slightly less likely to participate (56%) than men (67%). Participants who were deployed from active duty units were less likely to participate (41%) than those deployed from Reserve/National Guard units (78%).

Participants were deployed from Active Duty, Reserve, and National Guard units and represented the Army, Navy, Air Force, Marines, and Coast Guard branches of the military. Eighty-three participants (26.2%) were women. A table containing demographic and background characteristics of the sample is available from the first author. Female participants reported being deployed for a significantly longer period of time than their male counterparts, $t(301) = -2.36$, $p < .05$. Female participants were more likely to have been deployed from the Reserves while male participants were more likely to have been deployed from the National Guard, $\chi^2(2, N = 311) = 9.87$, $p < .05$. Female veterans were, on average, about 7 years younger than male veterans, $t(315) = 5.74$,

$p < .05$. Female veterans were more likely to belong to an ethnic or racial minority group than male veterans, $\chi^2(1, N = 310) = 7.37$, $p < .05$. Female veterans had fewer children, on average, compared with male veterans, $t(312) = 4.24$, $p < .05$.

Measures

All deployment stressor measures are from the Deployment Risk and Resilience Inventory (DRRI; King, King, & Vogt, 2003; King, King, Vogt, Knight, & Samper, in press), a collection of measures for studying the deployment-related experiences of military personnel and veterans.

Combat Experiences

Combat experiences, defined as stereotypical warfare experiences such as firing a weapon, being fired on (by enemy or friendly fire), witnessing injury and death, and going on special missions and patrols, were measured using a 15-item scale and a dichotomous (*yes/no*) response format. The Kuder-Richardson 20 coefficient alpha for this scale was .85 in this sample.

Aftermath of Battle

Aftermath of battle is defined as exposure to the consequences of combat, including observing or handling human and animal remains, dealing with prisoners of war, and observing other consequences of combat such as devastated communities and homeless refugees. This 15-item scale also used a dichotomous (*yes/no*) response format. The Kuder-Richardson 20 coefficient alpha for this scale was .89 in this sample.

Perceived Threat

Perceived threat is defined as fear for one's safety and well-being in the war zone, especially as a response to exposure to circumstances of combat including nuclear, biological, or chemical agents, missiles, and friendly fire incidents. This 15-item scale had a 5-point response format with anchors 1 (*strongly disagree*) to 5 (*strongly agree*). The coefficient alpha for this scale was .86.

Difficult Living and Working Environment

Difficult living and working environment is defined as exposure to events or circumstances representing repeated or day-to-day irritations and pressures related to life in the war zone. Participants responded to this 20-item scale using a 5-point response format with anchors 1 (*almost none of the time*) to 5 (*almost all of the time*). The coefficient alpha for this scale was .87.

Concerns About Family/Relationship Disruptions

Concerns about family/relationship disruptions is defined as the extent to which participants worried that deployment to the Gulf region might negatively affect family or other relationships. This eight-item scale, a subscale derived from a large scale intended to assess concerns about life and family disruptions, had a 4-point Likert response format with anchors 1 (*not at all*) to 4 (*A great deal*) and an additional option of 0 (*not applicable*). In scoring this measure, responses of *not applicable* were combined with responses of *not at all*. The coefficient alpha was .85.

Lack of Deployment Social Support

Lack of deployment social support is defined as the perception of a lack of assistance and encouragement in the war zone from other unit members, unit leaders, and the military in general. This 12-item scale had a 5-point response format with anchors ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Sexual Harassment

Sexual harassment is defined as unwanted sexual contact or verbal conduct of a sexual nature by other unit members, commanding officers, or civilians in the war zone that contributed to a hostile working environment. Respondents rated their experiences of sexual harassment on seven items; each had a 4-point response format with anchors from 1 (*never*) to 4 (*many times*). The coefficient alpha for this scale was .86.

Further information regarding these stressor measures and their psychometric properties are available in King, King, and Vogt (2003) and King et al. (in press). In addition to these stressors, we assessed several mental health outcomes.

Depression

Our measure of depression was adapted from the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). This seven-item measure (BDI-PC) has been used to reliably assess affective and cognitive symptoms of depression among medical patients (Beck, Steer, Ball, Ciervo, & Kabat, 1997).

Items were rated on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The coefficient alpha for this instrument was .91 in this sample.

Anxiety

Our measure of anxiety was adapted from the Beck Anxiety Inventory (BAI; Beck & Steer, 1990), and has demonstrated reliability and validity in the assessment of subjective anxiety among both inpatients and outpatients (BAI-PC; Beck et al., 1997). It contained seven items that were rated on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). The coefficient alpha for this instrument was .90 in the present sample.

Posttraumatic Stress Symptomatology

The military version of the PTSD Checklist (PCL-M; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers, Litz, Herman, Huska, & Keane, 1993) was used to assess posttraumatic stress symptomatology. This measure contains 17 items corresponding to the symptom criteria for PTSD. Respondents rated each item on a scale of 1 (*not at all*) to 5 (*extremely*). Using the recommended cutoff score of 50 (Weathers et al., 1993), twenty percent of our sample met criteria for PTSD. The coefficient alpha was .96.

Two different forms of the survey were developed, and several outcomes were split across forms to limit the time it would take participants to complete the survey. All participants completed the posttraumatic stress symptomatology measure; the depression and anxiety measures were administered to only half of the sample.

Analyses

Means were calculated separately for women and men on all deployment stressors and mental health measures. Next, independent samples *t* tests were computed to compare levels of exposure to deployment stressors and mental health outcomes for women and men. Then, effect sizes in the form of correlation coefficients (Rosenthal, 1984) were calculated for all contrasts. To evaluate gender-based differences in associations between deployment stressors and mental health outcomes, two hierarchical regression analyses were conducted for each of the three outcomes. The first regression involved the mission-related stressors of combat experiences, aftermath of battle, perceived threat, and difficult living and working environment; the second regression involved the interpersonal stressors of concerns about family/relationship disruptions, lack of deployment social support, and sexual harassment. For ease of interpretation, the variables representing the main effects of deployment factors were centered prior to the calculation of the product terms, as recommended by Jaccard, Turrisi, and Wan (1990), and Cohen, Cohen, West, and Aiken (2003). Centering is a procedure that involves subtracting the mean from all scores and that has the effect of reducing problems associated with multicollinearity. At the first step of each regression analysis, the set of deployment stressors was entered. At the second step, Gender and Deployment Stressor × Gender interactions or product terms were entered to evaluate the role of gender as a moderator of relationships between deployment stressors and mental health outcomes. We applied an adaptation of Fischer's protected *t* test (Cohen et al., 2003). That is, if the R^2 change from the first step to the second step was not significant, interaction terms at the second step were not interpreted to protect against inflated setwise Type I error rates. A final regression analysis examined the relative contribution of mission-related and interpersonal stressors in predicting mental health outcomes.

Results

Gender Differences in Deployment Stressors and Mental Health Outcomes

Table 1 presents descriptive statistics (means and *SD*s) for the deployment stressor and mental health outcome variables separately for women and men, as well as *t* statistics, their associated *df*s, and effects sizes (*r* values) for contrasts between women and men.[5] Of seven contrasts, there were three statistically significant differences. While women reported that they were exposed to more frequent incidents of sexual harassment and received less deployment social support, men reported more combat experiences. There were no gender differences in reported exposure to the aftermath of battle, perceived threat, difficult living and working environment, and concerns about family/relationship disruptions. With regard to the mental

[5]Regression analyses also were conducted to evaluate mean differences after accounting for gender differences in demographic/background characteristics (i.e., length of deployment, National Guard vs. Reserves duty status, age, minority status, and number of children). With one exception, the interpretation of findings was unchanged. When age was accounted for, the gender difference for deployment social support was no longer significant, suggesting that this finding may be related to the fact that the men in our sample were older, on average, compared with the women.

Table 1. Mean Comparisons Between Women and Men

Variable	Women		Men				
	M	*SD*	*M*	*SD*	*t*	*df*	*r*
Mission-related stressors							
Combat experiences	2.02	2.38	3.52	3.48	3.62*	313	.20
Aftermath of battle	5.41	4.18	5.70	4.38	.52	315	.03
Perceived threat	48.03	12.24	47.43	12.32	−.38	314	−.02
Difficult living and working environment	59.42	13.75	58.30	13.90	.63	313	−.04
Interpersonal stressors							
Concerns about family/relationship disruptions	17.38	6.35	18.14	6.30	.94	313	.05
Lack of deployment social support	38.73	12.19	29.24	11.02	−3.10*	314	−.17
Sexual harassment	9.74	4.44	7.27	1.08	7.89*	314	−.41
Mental health outcomes							
Depression	20.53	8.85	18.76	7.67	−1.26	161	−.10
Anxiety	17.86	8.53	15.18	6.85	−2.09*	162	−.16
Posttraumatic stress symptomatology	37.15	17.91	35.35	17.59	−.80	315	−.05

Note. $*p < .05$.

health outcomes, women and men reported similar levels of posttraumatic stress symptom severity and depression, but women reported higher levels of anxiety.

Concerning the magnitude of gender differences in deployment stressors and mental health outcomes, effect sizes for contrasts ranged in absolute value from .02 to .41. Six of the 10 effect sizes were quite minimal, .10 or less. The largest gender difference was for sexual harassment. While this difference met Cohen's (1977, 1988) guidelines for a moderate effect, the remaining three gender differences in experiences of deployment stressors and mental health outcomes were modest.

Gender Differences in Associations Between Deployment Stressors and Mental Health Outcomes

To examine gender differences in associations between deployment stressors and mental health outcomes, two hierarchical regression analyses were conducted for each of the three outcomes.[6] The first three columns in Table 2 display the results of the two hierarchical regression analyses that examined the impact of deployment stressors, gender, and the centered Deployment Stressor × Gender interactions on depression, one for the set of mission-related stressors and one for the interpersonal stressors. In the mission-related stressor regression, exposure to the aftermath of battle and difficult living and working environment were significantly associated with depression in Step 1. Although there was a significant interaction between perceived threat and gender at Step 2, the incremental change in variance accounted for was not significant, and thus, the potential for a Type I error precluded our interpretation of this interaction.

In the interpersonal stressor regression, only lack of deployment social support was related to depression in Step 1. The incremental change in variance accounted for from the first to the second step was significant, suggesting that the Interpersonal Stressor × Gender interactions added meaningfully to the prediction of depression. Two of these interaction terms attained statistical significance. The nature of these significant interactions is illustrated in Fig. 1. The functions represent associations between lack of deployment social support and depression (Fig. 1a) and sexual harassment and depression (Fig. 1b) calculated separately for women and men. As shown in Fig. 1a, as deployment social support becomes less available, levels of depression increase for both women and men; however, the slope is much steeper for women than for men, suggesting that lack of social support in the war zone may have represented a stronger risk factor for depression among women. As shown in Fig. 1b, as levels of sexual harassment increase, levels of depression increase sharply for men while levels of depression change very little for women, suggesting that sexual harassment may have represented a stronger risk factor depression among men.

The results of the next two hierarchical regression analyses are presented in the next three columns in Table 2: the impact of deployment stressors, gender, and the centered Deployment Stressor × Gender interactions on anxiety. In Step 1 of the mission-related stressor regression,

[6] A supplemental set of regression analyses was conducted to evaluate associations after accounting for gender differences in demographic/background characteristics. With one exception, the interpretations of these findings did not change. When minority status was included in the regression predicting anxiety from interpersonal stressors, the interaction between sexual harassment and gender did not attain statistical significance, suggesting that this interaction may be related to the fact that men were more likely to be nonminorities than women.

Table 2. Summary of Multiple Regression Analyses Predicting Mental Health Outcomes

Variable	Depression			Anxiety			Posttraumatic Stress Symptomatology		
	B	*SE* B	β	B	*SE* B	β	B	*SE* B	β
Mission-Related Stressors									
Step 1	$R = 0.50$, $R^2 = 0.25$, $F(4, 156) = 12.65$*			$R = 0.55$, $R^2 = 0.30$, $F(4, 157) = 16.94$***			$R = 0.63$, $R^2 = 0.39$, $F(4, 308) = 49.64$***		
Combat experiences	−0.03	0.23	−0.01	0.05	0.20	0.02	0.55	0.31	0.10†
Aftermath of battle	0.47	0.18	0.24**	0.20	0.16	0.11	0.60	0.24	0.15*
Perceived threat	0.10	0.06	0.14	0.18	0.05	0.28***	0.44	0.08	0.30***
Difficult living and working environment	0.14	0.06	0.24**	0.14	0.05	0.25**	0.30	0.08	0.23***
Step 2	$R = 0.54$, $R^2 = 0.29$, $F(9, 151) = 6.79$**			$R = 0.59$, $R^2 = 0.35$, $F(9, 152) = 8.93$***			$R = 0.63$, $R^2 = 0.40$, $F(9, 303) = 22.44$***		
Gender	−1.95	1.41	−0.11	−2.16	1.26	−0.13†	−3.06	2.00	−0.08
Combat experiences	0.61	0.53	0.23	0.01	0.47	0.00	1.58	0.81	0.29*
Aftermath of battle	0.07	0.30	0.03	−0.02	0.27	−0.01	0.09	0.45	0.02
Perceived threat	−0.12	0.11	−0.18	0.04	0.10	0.06	0.38	0.15	0.26**
Difficult living and working environment	0.28	0.11	0.47**	0.31	0.09	0.56***	0.32	0.15	0.25*
Combat Experiences × Gender	−0.75	0.59	−0.25	0.15	0.52	0.06	−1.16	0.89	−0.20
Aftermath of Battle × Gender	0.57	0.37	0.24	0.33	0.33	0.16	0.69	0.54	0.15
Perceived Threat × Gender	0.28	0.13	0.34*	0.17	0.12	0.21	0.09	0.18	0.05
Difficult Living and Working Environment × Gender	−0.19	0.12	−0.27	−0.25	0.11	−0.37*	−0.05	0.18	−0.04
	$\Delta R^2 = 0.04$ for Step 2 (*ns.*)			$\Delta R^2 = 0.04$ for Step 2 (*ns.*)			$\Delta R^2 = 0.01$ for Step 2 (*ns.*)		
Interpersonal stressors									
Step 1	$R = 0.43$, $R^2 = 0.18$, $F(3, 158) = 11.85$*			$R = 0.46$, $R^2 = 0.21$, $F(3, 159) = 14.40$***			$R = 0.53$, $R^2 = 0.28$, $F(3, 311) = 40.21$***		
Concerns about family/relationship disruptions	0.15	0.10	0.12	0.24	0.09	0.20	1.02	0.14	0.37***
Lack of deployment social support	0.26	0.06	0.36***	0.20	0.05	0.29	0.29	0.08	0.19***
Sexual harassment	0.18	0.21	0.06	0.41	0.19	0.16	1.36	0.33	0.21***
Step 2	$R = 0.50$, $R^2 = 0.25$, $F(7, 154) = 7.40$***			$R = 0.53$, $R^2 = 0.28$, $F(7, 155) = 8.45$***			$R = 0.55$, $R^2 = 0.30$, $F(7, 307) = 18.62$***		
Gender	2.21	1.57	0.12	0.36	1.44	0.02	3.15	2.13	0.08
Concerns about family/relationship disruptions	0.26	0.17	0.20	0.47	0.16	0.40**	0.87	0.26	0.31***
Lack of deployment social support	0.43	0.11	0.59***	0.35	0.10	0.51***	0.33	0.14	0.22*
Sexual harassment	−0.10	0.24	−0.04	0.10	0.22	0.04	1.13	0.39	0.17*
Concerns About family/relationship Disruptions × Gender	−0.18	0.21	−0.12	−0.33	0.19	−0.24†	0.15	0.31	0.05
Lack of Deployment Social Support × Gender	−0.25	0.12	−0.28*	−0.22	0.11	−0.27*	−0.09	0.17	−0.05
Sexual Harassment × Gender	3.23	1.00	0.28**	2.38	0.91	0.22**	2.60	1.02	0.14**
	$\Delta R^2 = 0.07$ for Step 2 ($p < 0.01$)			$\Delta R^2 = 0.06$ for Step 2 ($p < 0.05$)			$\Delta R^2 = 0.02$ for Step 2 (*ns.*)		

Note. ***$p < .001$. **$p < .01$. *$p < .05$. †$p < .10$.

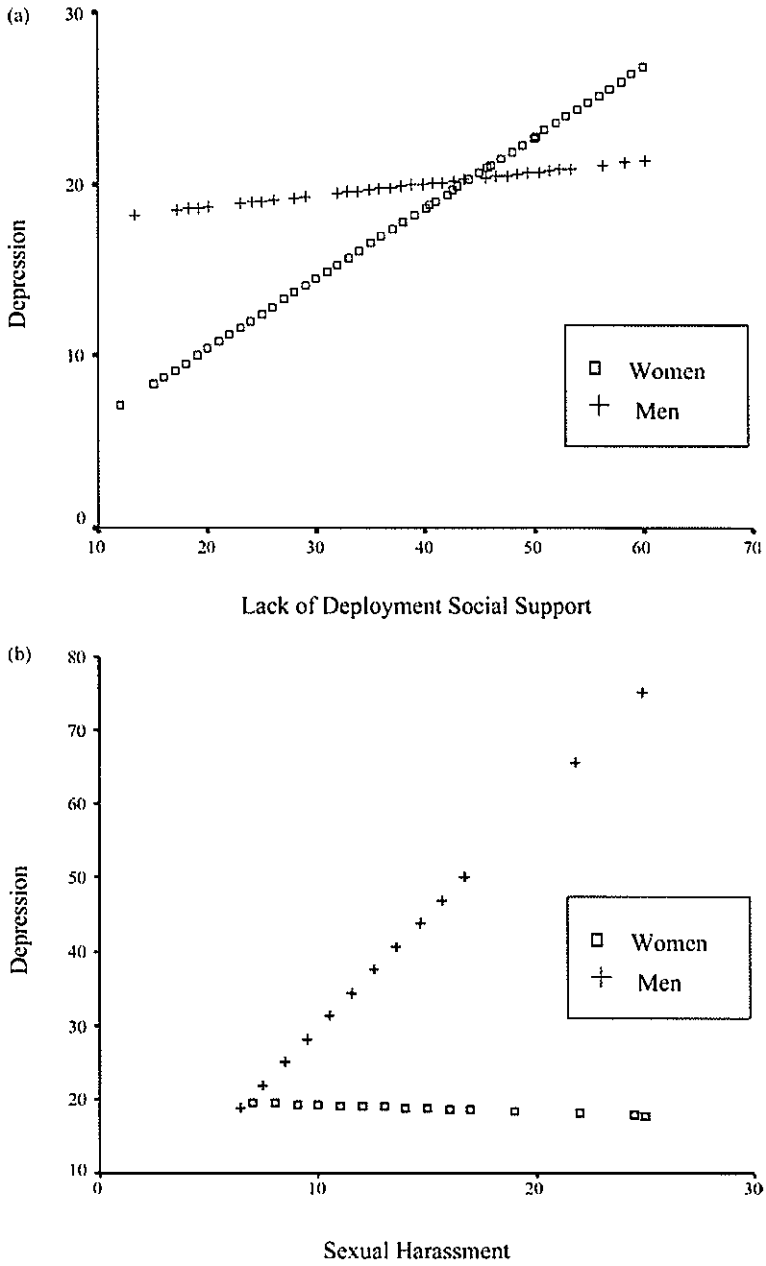

Fig. 1. Association between lack of deployment social support and depression for women and men (a). Association between sexual harassment and depression for women and men (b).

perceived threat and difficult living and working environment were significantly associated with anxiety. Although there was a significant interaction between difficult living and working environment and gender in Step 2, the incremental change in variance accounted for did not reach a conventional level of significance, and thus, again, the potential for a Type I error precluded our interpretation of this interaction.

In the regression involving interpersonal stressors, all three stressors were positively related to anxiety.

Moreover, the incremental change in variance in the second step was significant, suggesting that the Interpersonal Stressor × Gender interactions added meaningfully to the prediction of anxiety. Interactions involving lack of deployment social support and sexual harassment were significant, and the interaction involving concerns about family/relationship disruptions approached significance. The nature of these interactions is illustrated in Fig. 2. The functions represent associations of concerns about family/relationship disruptions (Fig. 2a), lack of deployment social support (Fig. 2b), and sexual harassment (Fig. 2c) with anxiety, calculated separately for women and men.

As shown in Fig. 2a, as concerns about family/relationship disruptions increased, levels of anxiety increased for both women and men; however, the slope was steeper for women than men, suggesting that concerns about family/relationship disruptions may have been a slightly stronger risk factor for anxiety among women. As shown in Fig. 2b, as deployment social support becomes less available, levels of anxiety increased for women but changed very little for men. This finding suggests that deployment social support may have served as a more important protective factor for women than for men. As shown in Fig. 2c, an increase in sexual harassment was accompanied by an increase in anxiety for both women and men; however, the slope for men was much steeper than it was for women, suggesting that, just as for depression, sexual harassment may have been a more important risk factor for anxiety among men.

The results of the last two hierarchical regressions are presented in the final three columns in Table 2: the impact of deployment stressors, gender, and the centered Deployment Stressor × Gender interactions on posttraumatic stress symptomatology.[7] In the mission-related stressor regression, exposure to the aftermath of battle, perceived threat, and difficult living and working environment were significantly associated with posttraumatic stress symptomatology in Step 1. The association between combat experiences and posttraumatic stress symptomatology approached significance. There were no significant interactions in the second step of this regression. In the interpersonal stressor regression, all three stressors were significantly associated with posttraumatic stress symptomatology in Step 1.[8] The incremental change in variance accounted for in the second step was not significant, and thus, our concern with Type I error precluded our interpretation of the Sexual Harassment × Gender interaction. Therefore, for both mission-related and interpersonal stressors, gender did not appear to moderate the impact of war-zone exposure on posttraumatic stress symptom severity.

With regard to the relative impact of mission-related versus interpersonal stressors on mental health, we examined the incremental change in variance accounted for by each set of variables after accounting for the effect of the other set of variables in a final series of regression analyses. Both sets of stressors contributed significant additional variance in the prediction of each of the mental health outcomes when they were entered at the second step. At the same time, for each of the three outcome variables, the variance accounted for by the set of mission-related stressors exceeded that of interpersonal stressors. Multiple partial correlation values for mission-related stressors were .40, .42, and .50 with depression, anxiety, and posttraumatic stress symptomatology, respectively. Multiple partial correlation values for interpersonal stressors were .28, .28, and .36 with depression, anxiety, and posttraumatic stress symptomatology, respectively.

Discussion

There is considerable evidence that war-zone exposure has negative mental health consequences; however, the majority of studies have used limited conceptualizations of war-zone exposure and focused on male samples. In this study, we sought to expand this literature by investigating both mission-related and interpersonal stressors and their associations with mental health outcomes among female and male Gulf War I veterans. We documented several important gender differences in exposure to deployment stressors and found a number of gender-based differences in relationships between deployment stressors and mental health outcomes. These findings can be used to inform clinical care as well as future investigations of war-zone exposure.

Findings from our analyses provided some support for our hypothesis that women would report more

[7] Two logistic regressions predicting PTSD diagnosis or status (*yes/no* based on a cutoff score of 50) also were conducted. For the regression predicting PTSD status from mission-related stressors, combat and perceived threat dropped from statistical significance in Step 1, suggesting that they were better predictors of posttraumatic stress symptomatology than PTSD status. Interaction terms were similarly nonsignificant in this regression. In the regression predicting PTSD status, the Gender × Sexual Harassment interaction dropped to marginal significance, but otherwise the findings were identical.

[8] In response to a reviewer's query about whether association between sexual harassment and posttraumatic stress symptomatology might have been driven by sexual assault, we conducted a regression in which we removed assault items from this measure. Results were nearly identical to those that included both nontraumatic and potentially traumatic experiences of sexual harassment, suggesting that this association holds when only nontraumatic aspects of sexual harassment are considered.

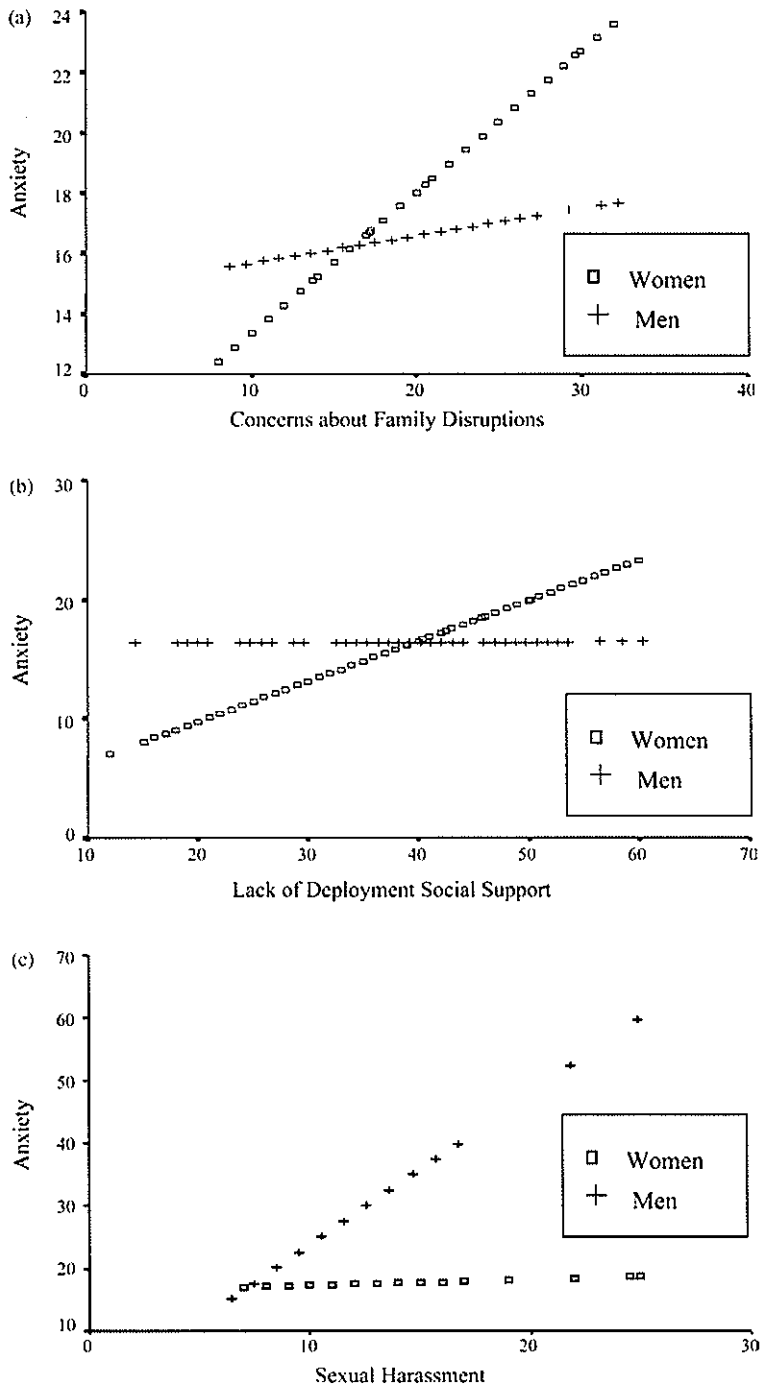

Fig. 2. Association between concerns about family/relationship disruptions and anxiety for women and men (a). Association between lack of deployment social support and anxiety for women and men (b). Association between sexual harassment and anxiety for women and men (c).

exposure to interpersonal stressors while men would report more exposure to mission-related stressors. The largest effect was for sexual harassment; women were significantly more likely to report this experience than men. Women also reported receiving somewhat less social support from supervisors and peers during deployment. These findings are consistent with prior research (Rosen et al., 1999; Wolfe, Brown, & Kelley, 1993). As discussed previously, these findings may be at least partially accounted for by the predominantly "male" culture of the military and women's numerical minority status in the military. These findings also are consistent with other research suggesting that women may be more likely than men to experience stressors of an interpersonal nature (Davidson, Hughes, Blazer, & George, 1991; Engel et al., 1993; Kessler et al., 1995; Suffoletta-Maierle, Grubaugh, Magruder, Monnier, & Frueh, 2003). The only stressor that men reported at a significantly higher rate was combat exposure. This finding also is consistent with previous research (e.g., King, King, et al., 1995).

Interestingly, women and men reported similar levels of exposure to the remaining deployment stressors. This finding, along with the fact that those gender differences that did exist were generally modest (with the exception of the finding for sexual harassment), and consistent with other recent research findings that demonstrated few gender differences in war-zone stressor exposure (Fontana, Litz, & Rosenheck, 2000), may suggest that military roles for women and men may be becoming more similar. However, the lack of gender differences also may reflect the less combat intensive nature of this particular deployment. Future research with veterans of other deployments, such as the Iraq War or the Afghanistan War, is clearly warranted. At the same time, the fact that several notable gender differences remain, especially among stressors that have demonstrated implications for postdeployment mental health (e.g., combat and sexual harassment), recapitulates the importance of multidimensional assessments of deployment stressors. In particular, these findings highlight the importance of assessing both stressors that are specific to the deployment mission (i.e., mission-related stressors) and stressors that are associated with social interactions and relationships during deployment (i.e., interpersonal stressors).

In terms of the mental health consequences of war-zone exposure, our findings generally supported our hypothesis that exposure to both mission-related stressors and interpersonal stressors would have negative implications for mental health outcomes. These findings are consistent with other literature indicating that symptoms associated with stress and trauma exposure often persist long after the stressful event has passed (Marshall et al., 2000). In this case, war-zone exposure is related to mental health, both assessed 10 years after deployment. Interestingly, combat exposure was not uniquely associated with any of the three mental health outcomes despite significant positive associations at the bivariate level. The negligible finding for posttraumatic stress symptomatology is especially noteworthy, as combat has long been considered the key factor in the development of PTSD in response to war-zone exposure. One possible explanation for this result is that the impact of combat may be mediated through perceived threat (King, King, et al., 1995).

Findings regarding concerns about family/ relationship disruptions also are intriguing. These results suggest that worries about family and relationships among deployed military personnel may have implications for mental health upon return from deployment. While these findings are consistent with at least one study that examined the impact of family concerns on postdeployment health (Bartone, Adler, & Viatkus, 1998), additional research is needed to identify how these concerns may translate into poor postdeployment mental health. The finding that lack of deployment social support was associated with mental health outcomes extends the literature on social support in the postdeployment period (King, Vogt, & King, 2003) to suggest that the social support that is available during one's deployment also is of critical importance.

With regard to gender-based differential associations, our results indicated that mission-related stressors had a similar impact on the mental health of women and men. This is interesting, especially with regard to combat. While men reported more combat exposure on average, for any given level of exposure, the expected level of posttraumatic stress symptomatology was the same for both genders. While these results are consistent with at least one study (Sutker et al., 1995), the lower rates of combat exposure reported by women may preclude interpretations regarding gender differences in the impact of high levels of combat.

Support for the hypothesis that interpersonal stressors would demonstrate stronger associations with mental health outcomes for women compared with men was mixed. Our findings generally suggested that both concerns about family/relationship disruptions and lack of deployment social support had a stronger impact on women's as compared with men's postdeployment mental health. These interpersonal stressors may have demonstrated stronger associations with women's mental health outcomes for a variety of reasons. As discussed previously, women are more likely to play a primary caregiving role in the family, and as such, concerns about disruptions to family life may be more detrimental to their well-being. Likewise, there is some evidence that

women place a stronger value on interpersonal relationships (Moskowitz et al., 1994), and this may account for the stronger association between lack of deployment social support and women's postdeployment mental health. This finding is consistent with other research suggesting that social support may be a more important buffer against negative mental health consequences of stress and trauma exposure for women than for men (e.g., King, King, Foy, Keane, & Fairbank, 1999; King, Mattimore, King, & Adams, 1995; Leiter, Clark, & Durup, 1994).

With regard to the impact of sexual harassment on mental health outcomes, findings did not support our hypothesis. Results suggested instead that sexual harassment may have had a stronger negative impact on men's than on women's mental health. These results are consistent with other research demonstrating that exposure to incidents of a sexual nature may be a stronger predictor of mental distress among men than women (Kessler et al., 1995) and may be related to gender-based expectations regarding the experience of sexual harassment (Stockdale, 1998). When a man is sexually harassed, it may be more unexpected, have a more stigmatizing effect, and consequently, be more detrimental to mental health. On a related note, it is likely that there is generally more social support available to women compared with men who experience sexual harassment. Thus, the present findings contribute to the growing recognition that military sexual harassment is an important issue for men as well as for women. However, it is important to note that the number of men who reported sexual harassment was very small in this sample (only about 10%), so while sexual harassment may have a more negative impact on the mental health of men, the actual experience of sexual harassment was much more common for women. Furthermore, we were unable to examine the specific circumstances surrounding sexual harassment for women and men in this study. It is possible that men's experiences of sexual harassment are qualitatively different than women's experiences. Future research is necessary to obtain a better understanding of this gender difference in the association between military sexual harassment and postdeployment mental health.

Consistent with our hypothesis, mission-related stressors demonstrated a stronger association with posttraumatic stress symptomatology than interpersonal stressors. Interestingly, mission-related stressors demonstrated a stronger relationship with depression and anxiety as well. Of course, these findings must be interpreted with caution given the differential number of mission-related and interpersonal stressors. Moreover, the finding that interpersonal stressors contributed significant variance in the prediction of each of the three mental health outcomes after accounting for the effect of mission-related stressors suggests the importance of both types of stressors. The greater number of Interpersonal Stressor × Gender interactions (in contrast with Mission-Related Stressor × Gender interactions) further suggests that gender may be more salient when stressors are of an interpersonal nature than when they are mission specific.

We close by noting that these results are based on retrospective data collected approximately 10 years after deployment to the 1990–1991 Gulf War. Thus, a potential limitation of this study is that findings may be affected by problems with retrospective recall of deployment exposures (King, King, et al., 1995). Moreover, the data are derived from self-reports, and as such, are subject to all of the cautions that self-report data engender. For example, there may be a tendency for one's contemporary mental state to influence accounts of prior experiences or conditions (King, King, et al., 1995). Data collected in the more immediate postwar period is clearly needed in future research on subsequent military cohorts. Especially useful will be longitudinal investigations of the impact of war-zone exposure on mental health across time.

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